Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte RICHARD SCHEPS

Appeal No. 2002-1951
Application No. 08/908,778

ON BRIEF

Before JERRY SMITH, BARRY, and BLANKENSHIP, *Administrative Patent Judges*.
BARRY, *Administrative Patent Judge*.

DECISION ON APPEAL

A patent examiner rejected claims 1-7. The appellant appeals therefrom under 35 U.S.C. § 134(a). We affirm-in-part.

BACKGROUND

The invention at issue on appeal concerns the imaging of an object submerged in water. Both military and civilian applications require searching for certain objects submerged in water. Detecting mines deployed in shipping lanes is an example of a military application, (Spec. at 1); locating submerged cables, pipelines, barrels, and oil

drums is an example of a civilian application. (*Id.* at 1-2.) For such applications, light detection and ranging ("lidar" or "LIDAR"), which uses light energy in a way analogous to the use of electromagnetic energy in radio detection and ranging ("radar" or "RADAR"), (*id.* at 1), "is commonly applied to the problem of detecting submerged objects in shallow water. . . ." (*Id.* at 2.)

The appellant asserts that conventional scanning lidar performs poorly in ambient light. Because a blue-green laser is typically used for underwater transmission, he explains, sunlight scattered back to a photomultiplier tube degrades a signal-to-noise ratio. Although surface scattering dictates that a laser/detector platform be submerged to prevent heavy losses in the transmitted signal, (*id.* at 2-3), the appellant adds that the use of conventional continuous wave ("CW") lasers prevents locating such a platform on an aircraft for use above the surface of the water. (*Id.* at 3.)

The inventive lidar features a laser for generating a line scan of light beam pulses to illuminate an area surrounding a submerged target. An image acquisition controller selects pulse width and pulse rate of the light beam pulses emitted by the laser. More specifically, the appellant asserts that the scanning beam is pulsed at a rate sufficient for high data acquisition rates use in high-resolution imaging applications

and at a high energy efficiency suitable for airborne platforms. (*Id.* at 4.) A photomultiplier tube detects energy from the light beam pulses scattered by the target and generates an output signal representing a series of pixels corresponding to the light beam pulses. The output signal is gated to block light scattered from ranges other than a selected range window for the target, e.g., from the water's surface. (*Id.* at 3-4.) In addition, they add that signal-to-noise ratio is improved relative to current line scanning systems using a CW laser by gating the received pulse to exclude most of the ambient sunlight and surface scattered light reaching the scanning beam detector. (*Id.* at 4.) A display generates an image from the output signal representing the target.

A further understanding of the invention can be achieved by reading the following claim.

1. An imaging lidar comprising:

a pulsed laser for generating at a pulse rate a sequence of light beam pulses each having a pulse width;

a spatial discriminator coupled to the pulsed laser for steering the light beam pulse sequence in a plurality of line scans describing an area surrounding a target, each said line scan including a plurality of said light beam pulses;

a photomultiplier tube for detecting energy from said light beam pulses scattered by said target and for generating an output signal representative of said scattered light beam pulse energy;

an image acquisition controller coupled to said pulsed laser and to said photomultiplier tube for selecting said pulse width and said pulse rate of said light beam pulses and for generating a display signal from said output signal of said photomultiplier tube;

and a display coupled to said controller for generating an image from said display signal representative of said target.

Claims 1, 3, 5, and 7 stand rejected under 35 U.S.C. § 102(b) as anticipated by U.S. Patent No. 5,457,639 ("Ulich"). Claim 2 stands rejected under 35 U.S.C. § 103(a) as obvious over Ulich in view of U.S. Patent No. 5,822,047 ("Contarino"). Claim 4 stands rejected under 35 U.S.C. § 103(a) as obvious over Ulich in view of U.S. Patent No. 5,082,639 ("Schneiter"). Claim 6 stands rejected under 35 U.S.C. § 103(a) as obvious over Ulich in view of U.S. Patent No. 5,117,126 ("Geiger").

OPINION

Our opinion addresses the following rejections:

- anticipation rejection of claims 1, 3, 5, and 7
- obviousness rejections of claims 2, 4, and 6.

Anticipation Rejection of Claims 1, 3, 5, and 7

Rather than reiterate the positions of the examiner or the appellant *in toto*, we address the two points of contention therebetween. First, the examiner asserts,

"[b]ecause in col. 7, lines 16-19, Ulich `639 clearly states that '*the high degree of scan lines provides for precise image to image intercalibration and registration*' while Ulich `639 discloses a scanner 20 providing the discrimination, it should be concluded that line scanning is a 'must' in Ulich `639. " (Examiner's Answer at 9.) He adds, "[a]n example of such line scanning is shown in figs. 3A-3B where the scan lines are clearly shown." (*Id.*) The appellant argues, "Ulich `639 fails to anticipate the spatial discriminator ('line scan') element of Appellant's invention as claimed in claim 1." (Appeal Br. at 5.)

"Analysis begins with a key legal question -- *what* is the invention *claimed*?" *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1567, 1 USPQ2d 1593, 1597 (Fed. Cir. 1987). In answering the question, "the Board must give claims their broadest reasonable construction. . . ." *In re Hyatt*, 211 F.3d 1367, 1372, 54 USPQ2d 1664, 1668 (Fed. Cir. 2000). "Moreover, limitations are not to be read into the claims from the specification." *In re Van Geuns*, 988 F.2d 1181, 1184, 26 USPQ2d 1057, 1059 (Fed. Cir. 1993) (citing *In re Zletz*, 893 F.2d 319, 321, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989)).

Here, claim 1 specifies in pertinent part the following limitations: "a spatial discriminator coupled to the pulsed laser for steering the light beam pulse sequence in a plurality of line scans describing an area surrounding a target, each said line scan including a plurality of said light beam pulses. . . ." Giving the claim its broadest, reasonable construction, the limitations require steering light pulses from a laser into a pattern of scanning lines.

"Having construed the claim limitations at issue, we now compare the claims to the prior art to determine if the prior art anticipates those claims." *In re Cruciferous Sprout Litig.*, 301 F.3d 1343, 1349, 64 USPQ2d 1202, 1206 (Fed. Cir. 2002). "[A]nticipation is a question of fact." *Hyatt*, 211 F.3d at 1371, 54 USPQ2d at 1667 (citing *Bischoff v. Wethered*, 76 U.S. (9 Wall.) 812, 814-15 (1869); *In re Schreiber*, 128 F.3d 1473, 1477, 44 USPQ2d 1429, 1431 (Fed. Cir. 1997). "A claim is anticipated . . . if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros., Inc. v. Union Oil Co.*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (citing *Structural Rubber Prods. Co. v. Park Rubber Co.*, 749 F.2d 707, 715, 223 USPQ 1264, 1270 (Fed. Cir. 1984); *Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548, 220 USPQ

193, 198 (Fed. Cir. 1983); *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771, 218 USPQ 781, 789 (Fed. Cir. 1983)).

Here, Ulich's "transmitter assembly consists of the laser 16, a beam projector 26 and scanner 20." Col. 5, ll. 19-20. The laser generates "short [light] pulses for range resolution and daylight noise rejection." Col. 5, ll. 10-11. "The beam projector 26 modifies the spatial cross section of the laser beam 28 to provide the appropriate beam footprint 30 at the water surface 32." *Id.* at ll. 23-25. We find that once the cross section of the laser beam 28 is modified into the beam footprint 30, the reference's scanner 20 steers the modified light pulses into a pattern. Specifically, "[t]he scanner 20 **steers** the output of the beam projector to provide both an adequate swath width and to compensate for aircraft roll variations." *Id.* at ll. 23-27 (emphasis added).

In addition, Ulich describes the pattern of the modified light pulse as comprising scanning lines. Specifically, "[n]ote also that the high degree of overlap between . . . **scan lines** provides for precise image to image intercalibration and registration, and allows for large scale scene reconstruction." Col. 7, ll. 16-19 (emphasis added). "Referring to FIGS. 3A and 3B [of Ulich], the results of actual scanning are shown." *Id.* at ll. 33-34. For its part, Figure 3A depicts the scanning lines as horizontal lines on a

white oval that represent "a buoyant opaque object 45 suspended in a Scripps Ocean Tank." *Id.* at ll. 34-35. Therefore, we affirm the anticipation rejection of claim 1.

Turning to claims 3 and 7, we recall that claims that are not argued separately stand or fall together. *In re Kaslow*, 707 F.2d 1366, 1376, 217 USPQ 1089, 1096 (Fed. Cir. 1983) (citing *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979)). When the patentability of a dependent claim is not argued separately, in particular, the claim stands or falls with the claim from which it depends. *In re King*, 801 F.2d 1324, 1325, 231 USPQ 136, 137 (Fed. Cir. 1986) (citing *In re Sernaker*, 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983); *In re Burckel*, 592 F.2d 1175, 1178-79, 201 USPQ 67, 70 (CCPA 1979)).

Here, rather than arguing the patentability of claims 3 and 7 separately, the appellant stipulates that "[t]he rejected claims . . . form a single group drawn to an imaging lidar." (Appeal Br. at 4.) Therefore, dependent claims 3 and 7 fall with independent claim 1, and we affirm the anticipation rejection of claims 3 and 7.

Second, the examiner asserts, "[a]s per claim 5, Ulich et al. further discloses the same imaging lidar wherein the controller gates the output signal from the multiplier

tube to select a range interval that includes the target (See Ulich et al. col. 6, lines 42-53)." (Examiner's Answer at 5.) The appellant argues, "Ulich '639 neither teaches nor suggests the *range-gating* element of the invention as . . . claimed. . . ." (Appeal Br. at 5.)

Claim 5 specifies in pertinent part the following limitations: "a temporal discriminator for gating said output signal from said photomultiplier tube to select a range interval that includes said target." Giving the claim its broadest, reasonable construction, the limitations require gating to select a range interval.

Turning to Ulich, the reference's "receiver assembly comprises the scanner 20, beam collection optics (co-aligned with the transmitter) 34, a narrow band optical filter 36, and camera 18." Col. 5, ll. 28-30. We find that the camera performs gating. Specifically, "[c]amera 18 (either one or more cameras may be used) comprises a photocathode optimized for maximum response at the transmitted wavelength, a **gateable** microchannel plate (MCP) which provides . . . **gating**. . . ." *Id.* at ll. 31-34 (emphases added). We further find that gating is performed in Ulich to select a range interval bounded by the bottom of the water. Specifically, "[t]o accommodate rapid variations in bottom depth as the aircraft maneuvers along the coastline, a separate

time resolved bottom detector 66 is used to determine slant range to the local bottom. Timing information derived from this sensor is fed through line 68 to the instrument control computer 44 and is sent through line 70 to **trigger the gate circuits of the camera(s)** 18 gates [sic] t**o ensure that the cameras follow the varying bottom depth**." Col. 6, ll. 39-46. Furthermore, we agree with the examiner that the appellant "never show[s] the difference between Ulich '639 geatable [sic, gateable] microchannel plate (MCP) which provides both fast gating and low noise amplification (See Ulich '639 col. 5, lines 23-40) and the claimed 'range gating'." (Examiner's Answer at 10.) Therefore, we affirm the anticipation rejection of claim 5.

Obviousness Rejections of Claims 2, 4, and 6

We address the main points of contention between the examiner and the appellant regarding claims 2, 4, and 6. "Regarding claim 2," (Examiner's Answer at 6), the examiner asserts, "one skilled in the art . . . would be motivated to incorporate the laser having a wavelength corresponding to blue-green color in Ulich et al.'s imaging lidar for the same purpose of minimizing absorption in water as taught by Contarino et al." (*Id.*) The appellant alleges, "[t]he Examiner offers no evidence of any kind, implicit or explicit, suggesting that it would be desirable to combine the teachings of Ulich '639 with those of Contarino. . . ." (Appeal Br. at 7.)

"Whether motivation to combine the references was shown [is] a question of fact." *Winner Int'l Royalty Corp. v. Wang*, 202 F.3d 1340, 1348, 53 USPQ2d 1580, 1586 (Fed. Cir. 2000) (citing *In re Dembiczak*, 175 F.3d 994, 1000, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999); *Monarch Knitting Mach. Corp. v. Sulzer Morat GMBH*, 139 F.3d 877, 881-83, 886, 45 USPQ2d 1977, 1982, 1985 (Fed. Cir. 1998)). "'[T]he question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.'" *In re Beattie*, 974 F.2d 1309, 1311-12, 24 USPQ2d 1040, 1042 (Fed. Cir. 1992) (quoting *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984)). "[E]vidence of a suggestion, teaching, or motivation to combine may flow from the prior art references themselves, the knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved. . . ." *Dembiczak*, 175 F.3d at 999, 50 USPQ2d at 1617 (citing *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1573, 37 USPQ2d 1626, 1630 (Fed. Cir. 1996); *Para-Ordnance Mfg. v. SGS Imports Int'l, Inc.*, 73 F.3d 1085, 1088, 37 USPQ2d 1237, 1240 (Fed. Cir. 1995)).

Here, we find that evidence of a suggestion, teaching, or motivation to combine Ulich and Contarino flows from the references themselves. Ulich teaches that the

wavelength of its laser 16 must be "chosen for optimal penetration into seawater," col. 5, ll. 12-13, within the range of "500 to 550 nm for coastal water. . . ." *Id.* at l. 13. For its part, Contarino discloses that using a wavelength of 532 nm, which is blue-green in color, "minimizes absorption in water. . . ." Col. 2, ll. 61-62. With absorption minimized, the "pulsed blue-green optical radiation . . . penetrates deep into the water. . . ." Col. 2, ll. 2-3. Because Ulich seeks a wavelength that optimizes penetration into water and specifies a range of wavelengths, and Contarino's blue-green wavelength penetrates deep into the water and lies within the range, we find that the combined teachings of the references would have suggested using a laser having a blue-green wavelength in Ulich's transmitter assembly. Therefore, we affirm the obviousness rejection of claim 2.

"As per claim 4," (Examiner's Answer at 6), admitting that, "Ulich et al. fails to particularly disclose the same imaging system wherein the pulse rate is about 600 Khz." (*id.* at 7), the examiner asserts, "Schneiter discloses the same imaging system wherein the pulse rate is about greater than 600 KHz (See Schneiter col. 16, lines 31-33)." (*Id.* at 7.) The appellant argues, "[n]othing in the Schneiter '362 reference in any way suggests the operating of an imaging lidar (or anything else) above 600 KHz; even the Schneiter '362 encoder chip operates no higher than 500 KHz." (Appeal Br. at 9.)

Although the examiner refers to "about greater than 600 KHz," claim 4 specifies in pertinent part the following limitations: "said pulse rate is **greater than** 600 KHz."[1] (Emphasis added.)

Having determined what subject matter is being claimed, the next inquiry is whether the subject matter would have been obvious. "In rejecting claims under 35 U.S.C. Section 103, the examiner bears the initial burden of presenting a *prima facie* case of obviousness." *In re Rijckaert*, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993) (citing *In re Oetiker*, 977 F.2d 1443, 1445, 24 USPQ2d 1443, 1444 (Fed. Cir. 1992)). "'A *prima facie* case of obviousness is established when the teachings from the prior art itself would . . . have suggested the claimed subject matter to a person of ordinary skill in the art.'" *In re Bell*, 991 F.2d 781, 783, 26 USPQ2d 1529, 1531 (Fed. Cir. 1993) (quoting *In re Rinehart*, 531 F.2d 1048, 1051, 189 USPQ 143, 147 (CCPA 1976)).

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[1]Claim 4 originally specified that "said pulse rate is about 700 KHz." (Paper No. 1 at 9.) Later, the limitation was amended to "greater than 600 KHz." (Paper No. 8 at 2.) Being primarily a board of review, we will let the examiner decide whether to make a rejection under 35 U.S.C. § 112, ¶ 1, as lacking an adequate written description.

Here, the passage of Schneiter cited by the examiner teaches that an "encoder reading section of the motor controller board can track encoder pulses at a rate up to 500 khz." Col. 16, ll. 31-33. We are not persuaded that the reference's disclosure of a maximum frequency of 500 kHz would have suggested the claimed pulse rate of greater than 600 kHz. Therefore, we reverse the obviousness rejection of claim 4.

"Regarding claim 6," (Examiner's Answer at 7)," admitting "that Ulich et al. fails to particularly disclose a periodically poled crystal gain element for generating laser output having frequency that is a multiple of a pumping frequency," (*id.* at 7), the examiner asserts, "Geiger discloses a periodically poled crystal gain element for generating laser output having frequency that is a multiple of a pumping frequency (See Geiger col. 5, lines 45-56, and col. 6, lines 7-15)." (*Id.*) The appellant argues, "Geiger '126 neither teaches nor suggests a periodically-poled crystal pulsed laser but instead describes a multi-crystal parametric optical oscillator." (Appeal Br. at 10.)

Claim 6 specifies in pertinent part the following limitations: "said laser comprises a periodically poled crystal gain element for generating a laser output having a frequency that is a multiple of a pumping frequency."

Turning to Geiger, "[a] stacked OPO [i.e., optical parametric oscillator] is disclosed wherein two or more optically nonlinear media, such as crystals, are coaxilly [sic, coaxially] disposed in a single resonator." Abs., ll. 1-3. The first passages of the reference cited by the examiner concerns matching "the actual gain length of the first crystal . . . to that of the second crystal," col. 5, ll. 46-47; the second passage concerns equalizing "the effective gains of the two crystals. . . ." Col. 6, ll. 14-15. The examiner fails to show how either passage would have suggested using a periodically poled crystal gain element in Ulich's laser. Therefore, we reverse the obviousness rejection of claim 6.

CONCLUSION

In summary, the rejection of claims 1, 3, 5, and 7 under § 102(b) and the rejection of claim 2 under § 103(a) are affirmed. In contrast, the rejections of claims 4 and 6 under § 103(a) are reversed. "Any arguments or authorities not included in the brief will be refused consideration by the Board of Patent Appeals and Interferences. . . ." 37 C.F.R. § 1.192(a)(2002). Accordingly, our affirmances are based only on the arguments made in the brief. Any arguments or authorities not included therein are

neither before us nor at issue but are considered waived. No time for taking any action connected with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED-IN-PART

JERRY SMITH
Administrative Patent Judge

LANCE LEONARD ~~BARRY~~
Administrative Patent Judge

HOWARD B. BLANKENSHIP
Administrative Patent Judge

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